



Caltrans Division of Research,  
Innovation and System Information

# Research Results

Maintenance

**NOVEMBER 2013**

**Project Title:**  
Research, Evaluation, and  
Implementation of Methods to  
Reduce Roadside Trash

**Task Number:** 1103

**Start Date:** August 1, 2007

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**Product Category:** New equipment and  
improved process

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## Developing Safer Methods for Removing Roadside Garbage

*Debris removal lift attachment improves litter collection and  
worker safety*

### WHAT WAS THE NEED?

Litter and illegal dumping on California's highway roadsides has become such a problem that, in 2006, Caltrans created the Litter Abatement Plan (Litter Plan), a comprehensive approach that addresses education, maintenance, and enforcement approaches to reduce litter.

One component of the Litter Plan is garbage collection. Most litter is collected and bagged by volunteers of the Adopt a Highway program or probationers, with Caltrans staff administering the programs and picking up the bags and debris. Removing the garbage from the roadway is primarily done by manual labor. Typically, a truck pulls over next to the bags, and a worker exits the vehicle to throw them into the truck. Because the time spent at any location is minimal, protective shoulder closures are not used. Workers are on foot at the road edge and vulnerable to passing traffic. They are also subject to physical injuries from lifting heavy debris. Solutions are needed to help with the collection to reduce staff exposure to traffic and injuries from handling and lifting the bags and debris.

### WHAT WAS OUR GOAL?

The goal was to develop a low-cost solution to improve litter and debris collection.



*The debris removal  
attachment fits on  
existing vehicles.*



DRISI provides solutions and  
knowledge that improve  
California's transportation system.

## WHAT DID WE DO?

Caltrans, in partnership with the University of California, Davis Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center, evaluated the current process for collecting and handling litter and debris. The team reviewed different methods, including dedicated debris removal vehicles, which increase productivity and safety by removing workers from the roadside, but are expensive to purchase, maintain, and operate. Their complexity requires specifically trained crews, which can hinder implementation within typical maintenance operations.

As a solution, the researchers designed and built a debris removal attachment (DRA) that fits on existing vehicles in the Caltrans fleet with minimal modifications and impact to the truck's current functions. The DRA lifts bagged litter and debris into the truck. It is operated from the truck cab, reducing worker exposure to traffic. The DRA prototype was tested in the lab and in the field.

## WHAT WAS THE OUTCOME?

The system can lift up to 100 pounds and functioned in limited field testing with an adequate cycle time. The DRA is a low-cost alternative to purchasing dedicated vehicles, attaches to existing trucks, and only requires an electrical power connection to the truck, making it easier to move and use. Additional development and testing is needed for field use by maintenance crews.

## WHAT IS THE BENEFIT?

Litter has a negative effect on environmental, social, and economic issues. The DRA is an innovative, low-cost, modular solution to collecting debris on state roadways. It improves the efficiency and safety of litter collection for cleanup crews, reducing lifting injuries and worker exposure to traffic. Using existing Caltrans trucks would enable multiple units to be purchased, allowing more areas to be serviced more frequently to achieve litter-free highways.

## LEARN MORE

To view the complete report:

[www.dot.ca.gov/research/researchreports/reports/2012/final\\_report\\_task\\_1103.pdf](http://www.dot.ca.gov/research/researchreports/reports/2012/final_report_task_1103.pdf)

For more information about the project:

<http://ahmct.ucdavis.edu/?projects=debris-removal-attachment>

*Caltrans DRV deployment in 2007*

